

FCC Certification Test Report

Report No.: FC170615E07-1

Test Model: P-R0001

Received Date: June 15, 2017

Test Date: June 20 to 22, 2017

Issued Date: June 30, 2017

Applicant: LOGITECH FAR EAST LTD.

Address: #2 Creation Rd. 4, Science-Based Ind. Park Hsinchu Taiwan, R.O.C.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location (1): E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin
Chu Hsien 307, Taiwan R.O.C.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specifically mentioned, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results.....	5
2.1 Measurement Uncertainty	5
2.2 Modification Record	5
3 General Information	6
3.1 Features of EUT	6
3.2 General Description of EUT	6
3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode	7
3.4 Test Program Used and Operation Descriptions.....	7
3.5 Primary Clock Frequencies of Internal Source	7
3.6 Miscellaneous.....	8
4 Configuration and Connections with EUT	9
4.1 Connection Diagram of EUT and Peripheral Devices	9
4.2 Configuration of Peripheral Devices and Cable Connections	10
5 Conducted Emissions at Mains Ports	11
5.1 Limits	11
5.2 Test Instruments	11
5.3 Test Arrangement	12
5.4 Supplementary Information	12
5.5 Test Results.....	13
6 Field Strength	15
6.1 Limits	15
6.2 Test Instruments (below 30MHz).....	16
6.3 Test Arrangement (below 30MHz).....	17
6.4 Test Results.....	18
6.5 Test Instruments (30MHz ~ 1000MHz)	20
6.6 Test Arrangement (30MHz ~ 1000MHz).....	21
6.7 Test Results.....	22
6.8 Test Instruments (above 1000MHz)	24
6.9 Test Arrangement (above 1000MHz)	25
6.10 Supplementary Information	25
6.11 Test Results	26
7 Pictures of Test Arrangements	28
Appendix – Information on the Testing Laboratories	29



Release Control Record

Issue No.	Description	Date Issued
FC170615E07-1	Original release.	June 30, 2017

1 Certificate of Conformity

Product: Mouse Pad

Brand: Logitech

Test Model: P-R0001

Sample Status: ENGINEERING SAMPLE

Applicant: LOGITECH FAR EAST LTD.

Test Date: June 20 to 22, 2017

Standards: FCC Part 18, Subpart C
FCC/OST MP-5: 1986

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :



Date:

June 30, 2017

Cindy Hsin / Specialist

Approved by :



Date:

June 30, 2017

Ken Lu / Manager

2 Summary of Test Results

Standard	Test Type	Result	Remarks
FCC Part 18, Subpart C	Conducted Test	PASS	Minimum passing margin is -4.67 dB at 20.33984 MHz
	Field Strength Measurement	PASS	Minimum passing margin is -4.40 dB at 13.5604 MHz

Note:

1. There is no deviation to the applied test methods and requirements covered by the scope of this report.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.31 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.12 dB
	6GHz ~ 18GHz	4.80 dB
	18GHz ~ 40GHz	5.52 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 Features of EUT

The tests reported herein were performed according to the method specified by LOGITECH FAR EAST LTD., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

3.2 General Description of EUT

Product	Mouse Pad
Brand	Logitech
Test Model	P-R0001
Sample Status	ENGINEERING SAMPLE
Operating Software	NA
Power Supply Rating	DC 5V from USB interface
Antenna Type	Loop printed antenna (Antenna gain: 1.6 dBi)
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT may have a lot of colors for marketing requirement.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.3 Operating Modes of EUT and Determination of Worst Case Operating Mode

Test mode is presented in the report as below.

Mode	Test Condition
1	Normal Operation

3.4 Test Program Used and Operation Descriptions

1. Turn on the power of all equipment.
2. The EUT links support unit E (Charging Coin Adapter) via BLE.
3. The EUT supplies power to the support unit E (Charging Coin Adapter) via wireless.
4. The EUT links support unit D (Mouse) via GSKF.
5. Support unit A (Laptop) runs "EMC test.exe" then sends "H" messages to itself.

3.5 Primary Clock Frequencies of Internal Source

The EUT is provided by LOGITECH FAR EAST LTD., for detailed internal source, please refer to the manufacturer's specifications.

3.6 Miscellaneous

Labelling Requirements for Part 18 Devices:

➤ Verification

The specific labelling requirements for a device subject to the Verification procedure are contained in Section 15.19(a). These labelling requirements are:

If the device is subject only to Verification, include a label bearing a unique identifier (Section 2.954) and one of three compliance statements specified in Section 15.19(a). If the labeling area for the device is so small, and/or it is not practical to place the compliance statement on the device, then the statement can be placed in the user manual or product packaging (Section 15.19(a)(5)). However, the device must still be labelled with the unique identifier (Verification). Generally, devices smaller than the palm of the hand are considered too small for the compliance statement.

➤ Certification

If the device is subject to Certification: (1) Section 2.925 contains information on identification of the equipment; (2) include a label bearing an FCC Identifier (FCC ID) (Section 2.926) and (3) include the appropriate compliance statement in Section 15.19(a). If the device is considered too small and therefore it is impractical (smaller than the palm of the hand) to display the compliance statement, then the statement may be placed in the user manual or product packaging. However, the device must still be labelled with the FCC ID. If the device is unquestionably too small for the FCC ID to be readable (smaller than 4-6 points), the FCC ID may be placed in the user manual. However, it must be determined that the device itself is too small – the label area allocated to the FCC ID may not be reduced because of over crowded identification of other product and regulatory information.

An electronic display of the FCC ID (see 9. Electronic Labelling below) may be used for Certification of Section 15.212 modular transmitters and software defined radios (Section 2.944).

➤ Declaration of Conformity (DoC):

The labelling requirements for a device subject to the DoC procedure are specified in Section 15.19(b). The label should include the FCC logo along with the Trade Name and Model Number, which satisfies the unique identifier requirement of Section 2.1074 if it represents the identical equipment tested for DoC compliance. For personal computers assembled from authorized components, the following additional text must also be included: “Assembled from tested components,” “Complete system not tested.” When the device is so small and/or when it is not practical to place the required additional text on the device, the text may be placed in the user manual or pamphlet supplied to the user. However, the FCC logo, Trade Name, and Model Number must still be displayed on the device (Section 15.19(b)(3)).



Part 15 Declaration of Conformity (DoC) Label Examples

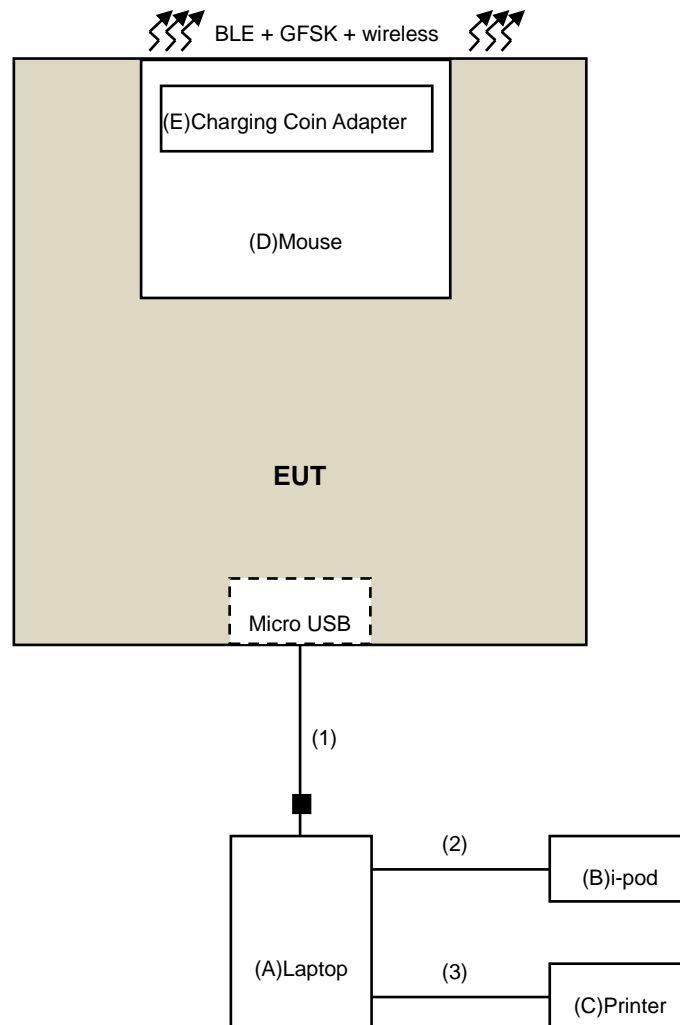
Equipment certified as software defined radio may use a means that readily displays the FCC ID on an electronic display screen, instead of labelling the device (Section 2.925 (e)).

Further information may refer to FCC KDB:784748 D01 Labelling Part 15 &18 Guidelines

* Insert either “A” or “B” but not both to identify the applicable Class of ITE.

4 Configuration and Connections with EUT

4.1 Connection Diagram of EUT and Peripheral Devices



4.2 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Laptop	DELL	E6230	NA	NA	Supplied by client
B	i-pod	Apple	MC749TA/A	CC4DMFJUJDFDM	NA	Provided by Lab
C	Printer	EPSON	LQ-300+II	G88Y074083	FCC DoC	Provided by Lab
D	Mouse	Logitech	G703	NA	NA	Supplied by client
E	Mouse Pad	Logitech	P-R0002	NA	NA	Supplied by client

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB to Micro USB Cable	1	1.8	Yes	1	Supplied by client
2	USB Cable	1	1.8	Yes	0	Provided by Lab
3	USB Cable	1	0.1	Yes	0	Provided by Lab

Note: The cores is originally attached to the cables.

5 Conducted Emissions at Mains Ports

5.1 Limits

ALL OTHER PART 18 CONSUMER DEVICES		
Frequency (MHz)	Conducted limit	
	Measured with a 50uH/50ohm LISN	
	Quasi-Peak (dBuV)	Average (dBuV)
0.15 ~ 0.5	66 ~ 56*	56 ~ 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

Notes: * Decreases with the logarithm of the frequency

5.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	100375	May. 09, 2017	May. 08, 2018
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Aug. 31, 2016	Aug. 30, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 03, 2017	June 02, 2018
RF Cable	5D-FB	COACAB-002	Mar. 03, 2017	Mar. 02, 2018
10 dB PAD Mini-Circuits	HAT-10+	CONATT-003	Sep. 13, 2016	Sep. 12, 2017
50 ohms Terminator	N/A	EMC-03	Sep. 29, 2016	Sep. 28, 2017
50 ohms Terminator	N/A	EMC-02	Sep. 29, 2016	Sep. 28, 2017
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

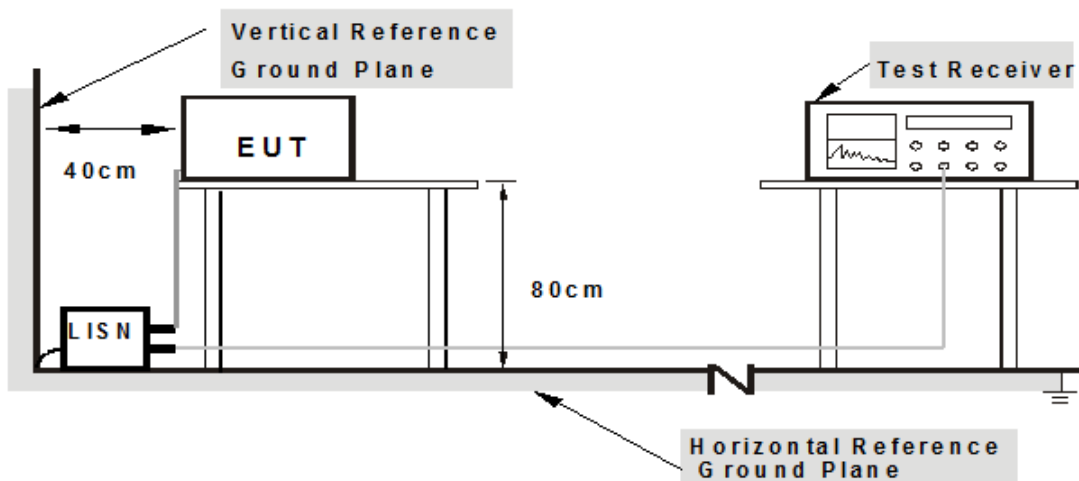
Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: June 20, 2017

5.3 Test Arrangement

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.



Note: 1. Support units were connected to second LISN.

For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

5.4 Supplementary Information

There is not any deviation from the test standards for the test method.

5.5 Test Results

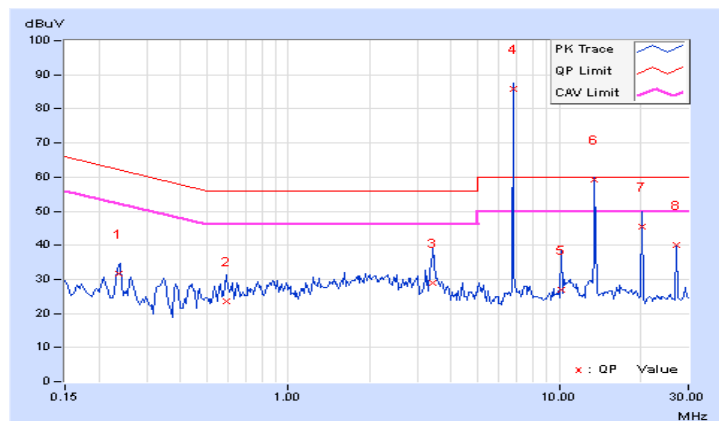
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power (system)	120Vac, 60Hz	Environmental Conditions	26°C, 73%RH
Tested by	Eagle Chen		
Test Mode	Mode 1		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.23594	10.12	21.44	6.69	31.56	16.81	62.24	52.24	-30.68	-35.43
2	0.59141	10.22	13.36	4.29	23.58	14.51	56.00	46.00	-32.42	-31.49
3	3.43359	10.38	18.54	9.41	28.92	19.79	56.00	46.00	-27.08	-26.21
4*	6.78125	10.49	75.33	50.45	85.82	60.94	NA	NA	NA	NA
5	10.18750	10.59	16.29	3.95	26.88	14.54	60.00	50.00	-33.12	-35.46
6*	13.55859	10.71	48.55	40.47	59.26	51.18	NA	NA	NA	NA
7	20.33984	10.93	34.50	34.40	45.43	45.33	60.00	50.00	-14.57	-4.67
8	27.12109	11.12	29.00	28.66	40.12	39.78	60.00	50.00	-19.88	-10.22

*: The test No.4 and No.6 have no limit in ISM band.

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



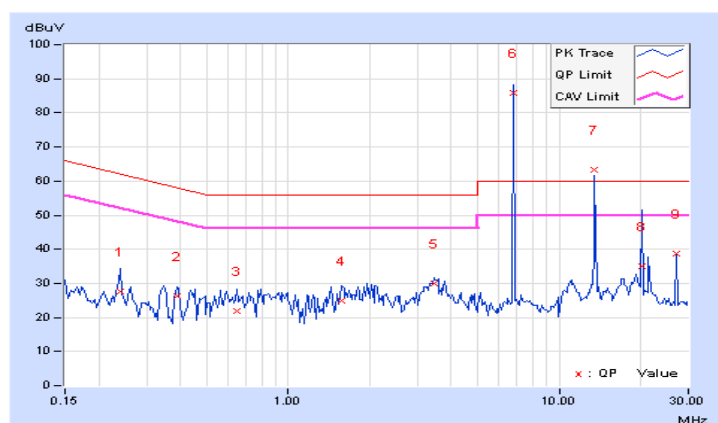
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power (system)	120Vac, 60Hz	Environmental Conditions	26°C, 73%RH
Tested by	Eagle Chen		
Test Mode	Mode 1		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.23984	10.20	17.44	6.46	27.64	16.66	62.10	52.10	-34.46	-35.44
2	0.38828	10.27	16.01	13.38	26.28	23.65	58.10	48.10	-31.82	-24.45
3	0.65000	10.30	11.44	2.97	21.74	13.27	56.00	46.00	-34.26	-32.73
4	1.57422	10.39	14.61	5.95	25.00	16.34	56.00	46.00	-31.00	-29.66
5	3.44922	10.47	19.41	9.56	29.88	20.03	56.00	46.00	-26.12	-25.97
6*	6.78125	10.55	75.37	50.47	85.92	61.02	NA	NA	NA	NA
7*	13.55859	10.73	52.49	23.51	63.22	34.24	NA	NA	NA	NA
8	20.33984	10.95	24.18	24.04	35.13	34.99	60.00	50.00	-24.87	-15.01
9	27.12109	11.05	27.76	27.42	38.81	38.47	60.00	50.00	-21.19	-11.53

*: The test No.6 and No.7 have no limit in ISM band.

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



6 Field Strength

6.1 Limits

ANY TYPE UNLESS OTHERWISE SPECIFIED(MISCELLANEOUS)			
Frequency (MHz)	at 300 meters	at 10 meters	at 3 meters
	Quasi-Peak (uV/m)	Quasi-Peak (dBuV/m)	Quasi-Peak (dBuV/m)
Any ISM frequency	25	57.50	67.95
Any Non- ISM frequency	15	53.06	63.52

Frequency band in which device operates (MHz)	Range of frequency measurements	
	Lowest frequency	Highest frequency
Below 1.705	Lowest frequency generated in the device, but not lower than 9 kHz.	30 MHz
1.705 to 30	Lowest frequency generated in the device, but not lower than 9 kHz.	400 MHz
30 to 500	Lowest frequency generated in the device or 25 MHz, whichever is lower.	Tenth harmonic or 1,000 MHz, whichever is higher.
500 to 1,000	Lowest frequency generated in the device or 100 MHz, whichever is lower.	Tenth harmonic.
Above 1,000	do	Tenth harmonic or highest detectable emission.

6.2 Test Instruments (below 30MHz)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 06, 2016	July 05, 2017
*Pre-Amplifier EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
*Loop Antenna Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	5D-FB	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Software BVADT	ADT_Radiated_ V8.7.08	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. G.
3. Tested Date: June 22, 2017

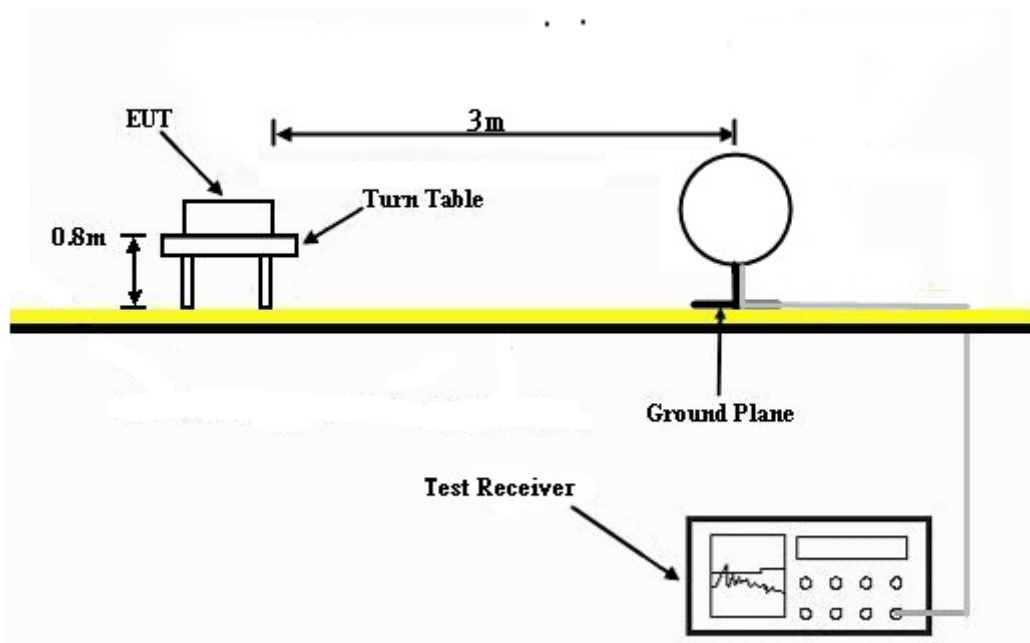
6.3 Test Arrangement (below 30MHz)

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility.
- The loop antenna is placed at a height of 1.0 m (center of loop) at a set distance of 3 m from the periphery of the EUT.
- Emission readings in frequency range of 0.15 MHz to 30 MHz are measured using a Quasi-Peak detector.
- During the compliance scan, a number of variables should be altered in combination in order to maximize the emission for each frequency.

The variables are:

- EUT Azimuth. This is varied by rotating the turntable a full 360° for each frequency of interest.
- Antenna Azimuth. Position the loop antenna vertically in all azimuths, record the maximum readings obtained.

Note1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz for quasi-peak detection (QP) at frequency up to 30MHz.



Note2: KDB 414788 OATS and Chamber Correlation Justification

-Based on FCC 15.31(f)(2) : measurements may be performed at a distance closer than that specified in the regulations; however, an attempts should be made to avoid making measurements in the near field.

-OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

6.4 Test Results

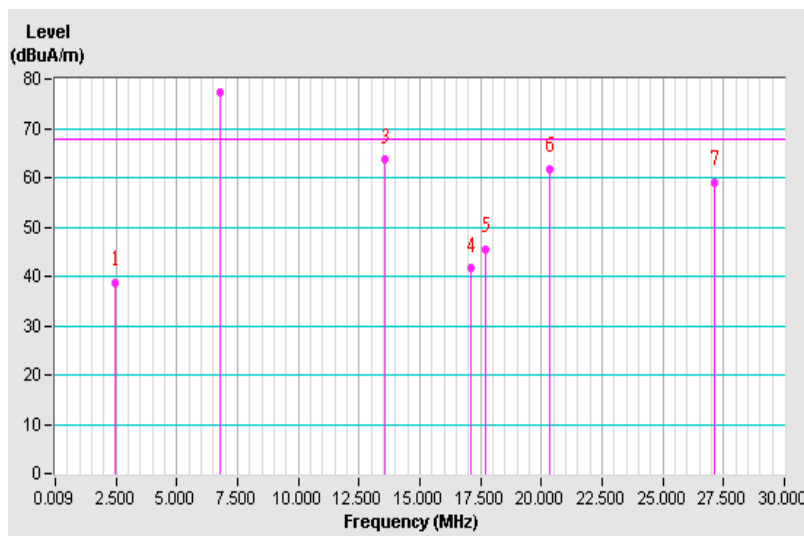
Frequency Range	9kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 200Hz; Quasi-Peak (QP), 9kHz
Input Power	DC 5V from USB interface	Environmental Conditions	25°C, 60%RH
Tested by	Mike Hsieh		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2.4413	38.80 QP	68.00	-29.20	1.00 H	234	40.90	-2.10
2*	6.7795	77.30 QP	NA	NA	1.00 H	304	80.50	-3.20
3	13.5604	63.60 QP	68.00	-4.40	1.00 H	360	67.30	-3.70
4	17.0844	41.60 QP	68.00	-26.40	1.00 H	297	45.80	-4.20
5	17.6947	45.50 QP	68.00	-22.50	1.00 H	204	49.80	-4.30
6	20.3399	61.70 QP	68.00	-6.30	1.00 H	360	66.20	-4.50
7	27.1209	58.90 QP	68.00	-9.10	1.00 H	360	61.90	-3.00

*: The test No.2 has no limit in ISM band.

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



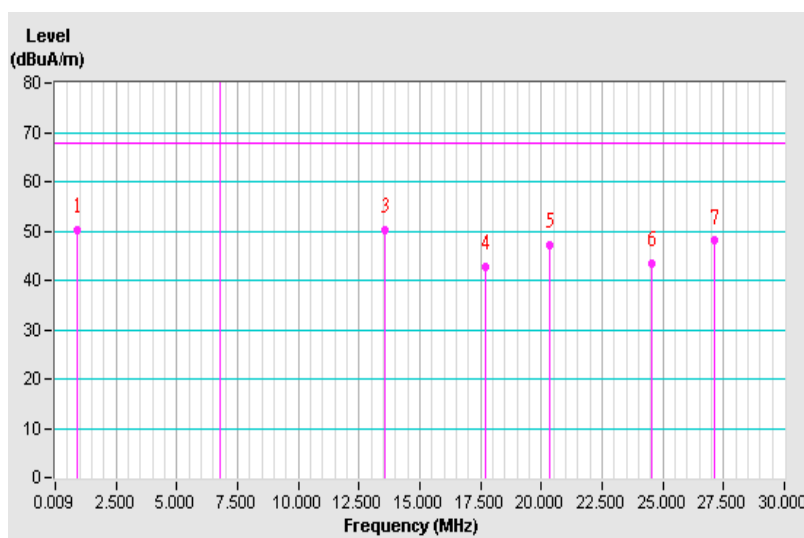
Frequency Range	9kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 200Hz; Quasi-Peak (QP), 9kHz
Input Power	DC 5V from USB interface	Environmental Conditions	25°C, 60%RH
Tested by	Mike Hsieh		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.9207	50.20 QP	68.00	-17.80	1.00 V	16	49.00	1.20
2*	6.7795	82.90 QP	NA	NA	1.00 V	63	86.10	-3.20
3	13.5604	50.20 QP	68.00	-17.80	1.00 V	330	53.90	-3.70
4	17.6947	42.70 QP	68.00	-25.30	1.00 V	253	47.00	-4.30
5	20.3399	47.10 QP	68.00	-20.90	1.00 V	319	51.60	-4.50
6	24.5326	43.60 QP	68.00	-24.40	1.00 V	117	47.20	-3.60
7	27.1209	48.00 QP	68.00	-20.00	1.00 V	326	51.00	-3.00

*: The test No.2 has no limit in ISM band.

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. The test point 2 is main power and it has no limit in this ISN band.



6.5 Test Instruments (30MHZ ~ 1000MHZ)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 06, 2016	July 05, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-03	Nov. 10, 2016	Nov. 09, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Dec. 13, 2016	Dec. 12, 2017
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-CHG-01	Oct. 05, 2016	Oct. 04, 2017
RF Cable	8D-FB	CHGCAB-001-1	Oct. 02, 2016	Oct. 01, 2017
		CHGCAB-001-2	Oct. 02, 2016	Oct. 01, 2017
	RF-141	CHGCAB-004	Oct. 02, 2016	Oct. 01, 2017
Software BVADT	ADT_Radiated _V8.7.08	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

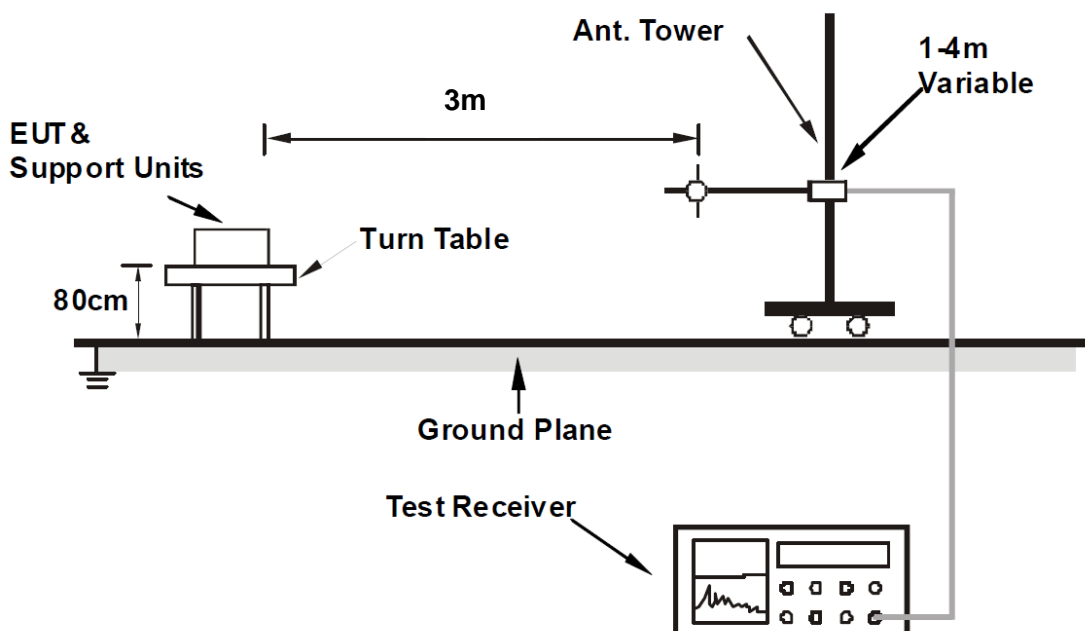
Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. G.
3. Tested Date: June 21, 2017

6.6 Test Arrangement (30MHz ~ 1000MHz)

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

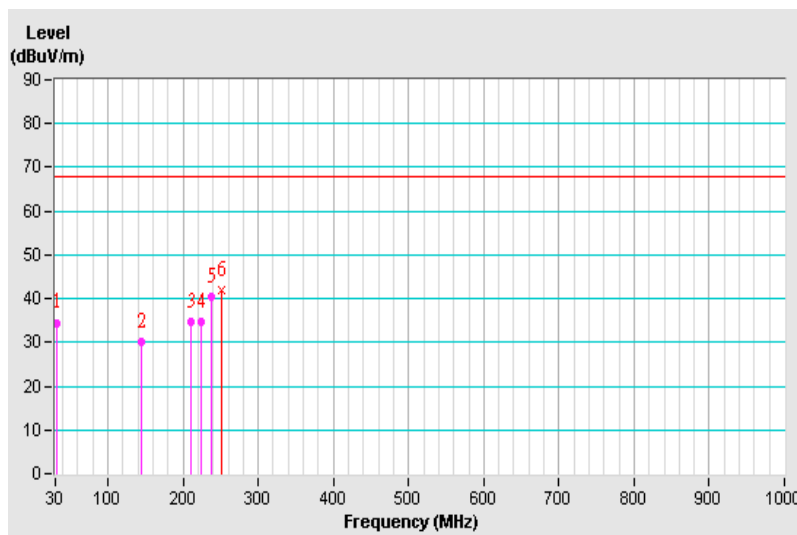
6.7 Test Results

Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	DC 5V from USB interface	Environmental Conditions	23°C, 75%RH
Tested by	Jason Huang		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	32.7200	34.51 QP	68.00	-33.49	3.00 H	134	43.68	-9.17
2	144.4400	30.17 QP	68.00	-37.83	3.00 H	134	37.78	-7.61
3	210.1800	34.56 QP	68.00	-33.44	1.00 H	337	45.34	-10.78
4	223.7300	34.52 QP	68.00	-33.48	1.00 H	348	45.18	-10.66
5	237.2900	40.56 QP	68.00	-27.44	1.00 H	352	49.95	-9.39
6	250.8700	41.98 QP	68.00	-26.02	1.00 H	61	50.77	-8.79

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



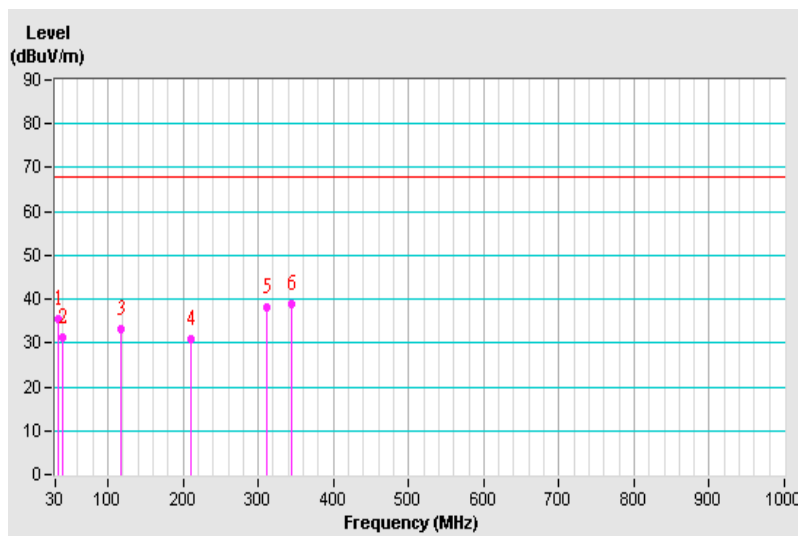
Frequency Range	30MHz ~ 1GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120kHz
Input Power	DC 5V from USB interface	Environmental Conditions	23°C, 75%RH
Tested by	Jason Huang		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 10 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	33.9000	35.59 QP	68.00	-32.41	1.00 V	0	44.52	-8.93
2	40.6500	31.09 QP	68.00	-36.91	1.00 V	114	39.58	-8.49
3	117.8800	33.00 QP	68.00	-35.00	1.00 V	249	42.90	-9.90
4	210.1800	30.95 QP	68.00	-37.05	1.00 V	269	41.73	-10.78
5	311.6200	37.97 QP	68.00	-30.03	2.00 V	0	44.41	-6.44
6	344.9300	38.85 QP	68.00	-29.15	2.00 V	0	44.68	-5.83

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



6.8 Test Instruments (above 1000MHz)

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 06, 2016	July 05, 2017
Horn_Antenna FT-RF	HA-07M18G-NF	0000320091110	Dec. 15, 2016	Dec. 14, 2017
Pre-Amplifier Agilent	8449B	3008A02578	June 19, 2017	June 18, 2018
RF Cable	104 RF cable	150406 131217 131205	Jan. 14, 2017	Jan. 13, 2018
Spectrum Analyzer Agilent	E4446A	MY48250253	Nov. 23, 2016	Nov. 22, 2017
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 10, 2016	Dec. 09, 2017
Horn Antenna SCHWARZBECK	BBHA 9170	9170-424	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36442/2 36434/2	Dec. 09, 2016	Dec.08, 2017
Software BVADT	ADT_Radiated_ V8.7.08	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

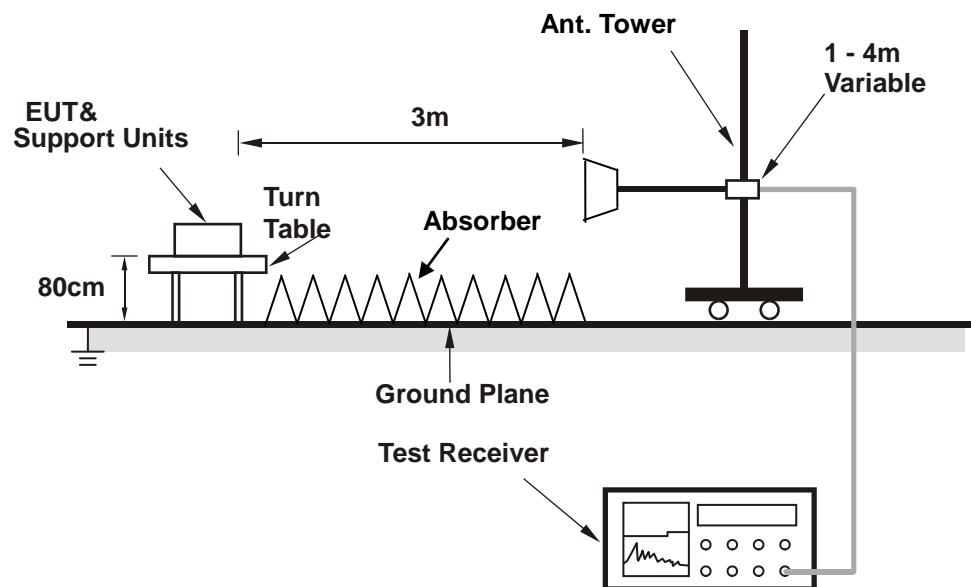
Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. G.
3. Tested Date: June 21, 2017

6.9 Test Arrangement (above 1000MHz)

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna can be varied from one meter to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The spectrum analyzer system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

Note: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection (PK) at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.



The test arrangement is in accordance with ANSI 63.4:2014. For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

6.10 Supplementary Information

There is not any deviation from the test standards for the test method.

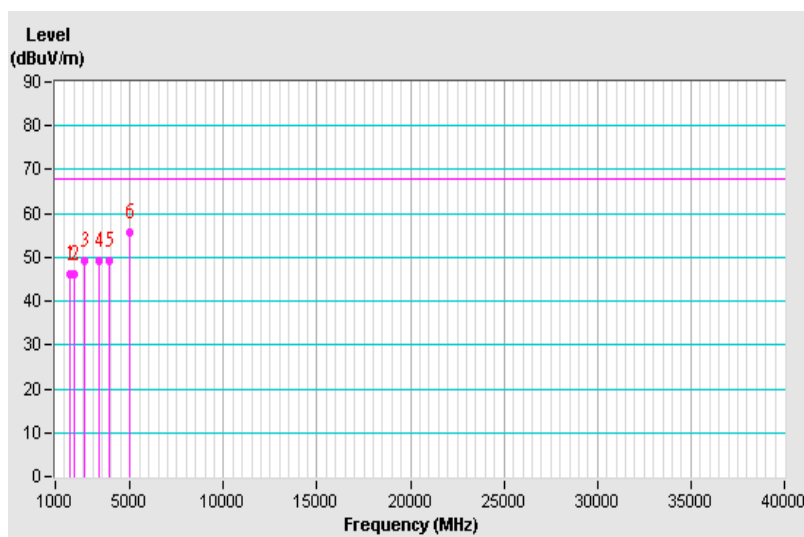
6.11 Test Results

Frequency Range	1GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	DC 5V from USB interface	Environmental Conditions	23°C, 73%RH
Tested by	Jason Huang		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1761.2200	45.99 PK	68.00	-22.01	1.00 H	323	46.58	-0.59
2	1995.7100	46.12 PK	68.00	-21.88	1.00 H	125	45.61	0.51
3	2568.0000	49.27 PK	68.00	-18.73	1.00 H	355	45.86	3.41
4	3334.1200	49.34 PK	68.00	-18.66	1.00 H	149	44.01	5.33
5	3891.7700	49.15 PK	68.00	-18.85	1.00 H	45	41.88	7.27
6	4987.5400	55.67 PK	68.00	-12.33	1.00 H	121	44.52	11.15

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



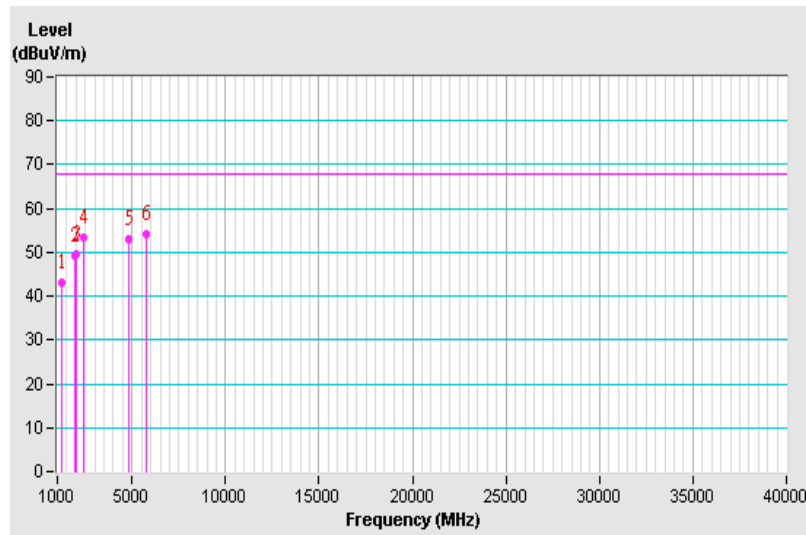
Frequency Range	1GHz ~ 40GHz	Detector Function & Resolution Bandwidth	Peak (PK) / Average (AV), 1MHz
Input Power	DC 5V from USB interface	Environmental Conditions	23°C, 73%RH
Tested by	Jason Huang		
Test Mode	Mode 1		

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	1234.1100	42.99 PK	68.00	-25.01	1.00 V	15	46.69	-3.70
2	1944.2800	49.34 PK	68.00	-18.66	1.00 V	172	49.05	0.29
3	1992.6200	49.54 PK	68.00	-18.46	1.00 V	152	49.05	0.49
4	2405.9100	53.30 PK	68.00	-14.70	1.00 V	79	50.40	2.90
5	4804.1200	53.11 PK	68.00	-14.89	1.00 V	48	42.50	10.61
6	5721.0500	54.27 PK	68.00	-13.73	1.00 V	166	40.88	13.39

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



7 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---